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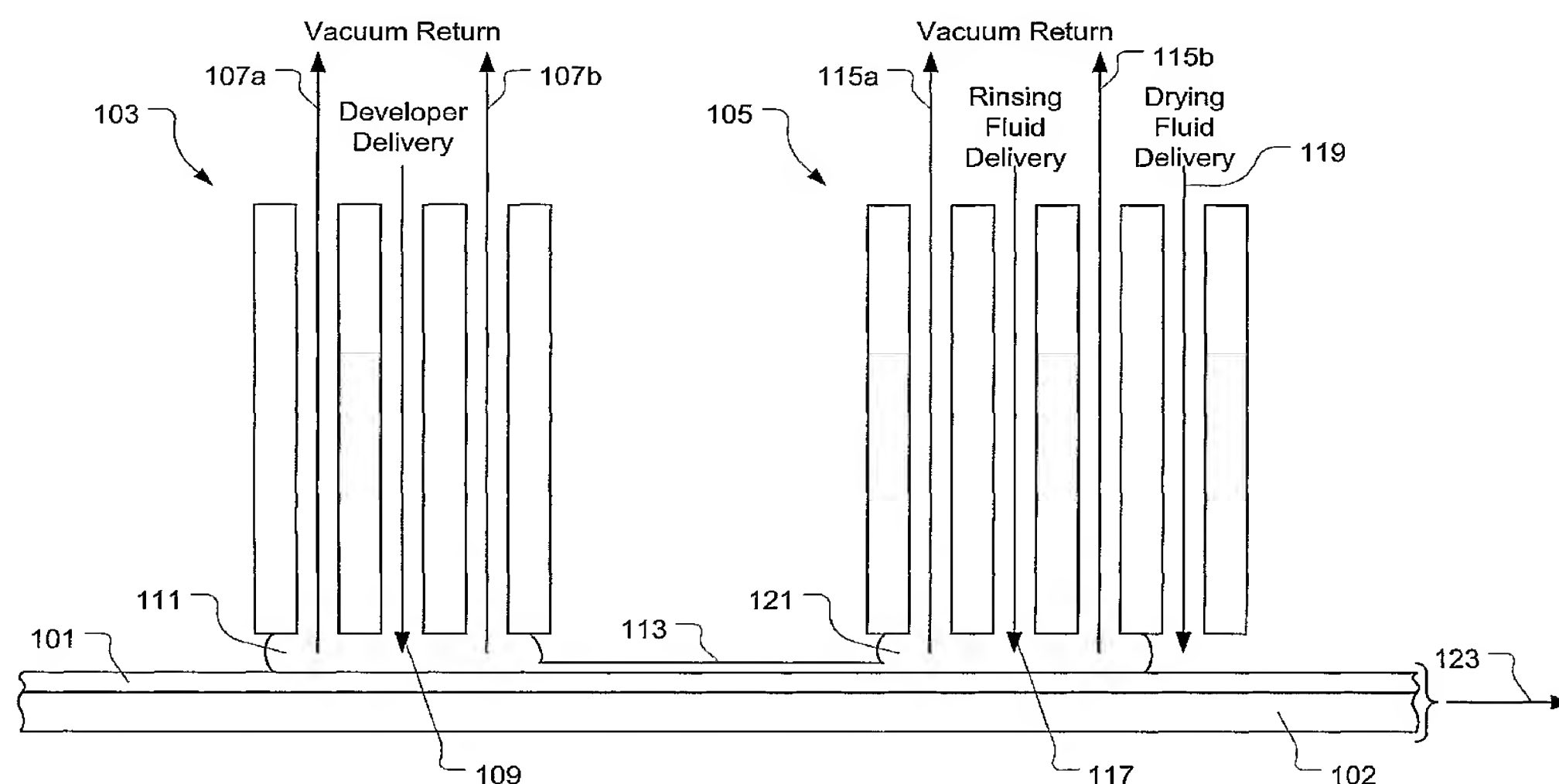
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(54) Title: APPARATUS FOR DEVELOPING PHOTORESIST AND METHOD FOR OPERATING THE SAME



(57) Abstract: A first proximity head is configured to define a meniscus of a photoresist developer solution on a substrate. The meniscus is to be defined between a bottom of the first proximity head and the substrate. A second proximity head is configured to define a rinsing meniscus on the substrate and remove the rinsing meniscus from the substrate. The second proximity head is positioned to follow the first proximity head relative to a traversal direction of the first and second proximity heads over the substrate. Exposure of the substrate to the meniscus of photoresist developer solution causes previously irradiated photoresist material on the substrate to be developed to render a patterned photoresist layer. The first and second proximity heads enable precise control of a residence time of the photoresist developer solution on the substrate during the development process.

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## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 06/30773

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - B08B 3/00 (2007.01)

USPC - 430/326

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

USPC - 430/326

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
USPC - 430/326, 134/95.2, 430/313, 430/314

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Electronic Databases Searched: photoresist, cleaning, rinsing, drying, developer, IPA, water, proximity head, meniscus, vacuum, residence time

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X — Y	US 2004/0182422 A1 (Boyd et al.) 23 September 2004 (23.09.2004), entire document, especially para [0102]-[0104] and para [0115].	1-3, 5-7 and 10-22 4, 8 and 9
Y	US 6,794,300 B1 (Hillman) 21 September 2004 (21.09.2004), entire document, especially col. 4, ln 38-67.	4, 8 and 9

☐ Further documents are listed in the continuation of Box C.

## \* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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**ABSTRACT:**

CHG DATE=20071116 STATUS=O>A first proximity  
head is configured to define a meniscus of a

photoresist developer solution on a substrate. The meniscus is to be defined between a bottom of the first proximity head and the substrate. A second proximity head is configured to define a rinsing meniscus on the substrate and remove the rinsing meniscus from the substrate. The second proximity head is positioned to follow the first proximity head relative to a traversal direction of the first and second proximity heads over the substrate. Exposure of the substrate to the meniscus of photoresist developer solution causes previously irradiated photoresist material on the substrate to be developed to render a patterned photoresist layer. The first and second proximity heads enable precise control of a residence time of the photoresist developer solution on the substrate during the development process.